

# 2011 PHMSA State Damage Prevention Grant – Final Report

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**Funding Opportunity Number:** DTPH56-11-SN-0001  
**CFDA Number:** 20.720  
**Award Number:** DTPH56-11-G-PHPS01

**Project Title:** Utility Notification Center of Colorado State Damage Prevention

**Date Submitted:** April 30, 2012

**Submitted by:** J.D. Maniscalco  
Executive Director,  
Utility Notification Center of Colorado (Colorado 811)

## **Specific Objective(s) of the Agreement**

*[Cut and paste from Article II, Section 2.03 of your agreement.]*

### **Section 2.03 Specific Objective(s) of the Agreement**

Under this grant agreement, the UNCC will:

- Foster Support and Partnership with Stakeholders (See Element 2)
- Support Public Awareness and Stakeholder Education (See Element 5)
- Support a Damage Prevention Education Program for industry stakeholders (See Element 4)
- Foster and promote the use of Improving Technologies (See Element 8) and
- Review the Effectiveness of Damage Prevention Programs (See Element 9)

## **Workscope**

*[Cut and paste from Article III. Workscope of your agreement.]*

### **Article III. Workscope**

Under the terms of this grant agreement, the Grantee will address the following elements listed in 49 USC §60134 through the actions it has specified in its Application.

- Element (2): A process for fostering and ensuring the support and partnership of stakeholders, including excavators, operators, locators, designers, and local government in all phases of the program.
- Element (5): A process for fostering and ensuring active participation by all stakeholders in public education for damage prevention activities.
- Element (4): Participation by operators, excavators, and other stakeholders in the development and implementation of effective employee training programs to ensure that operators, the one call center, then enforcing agency, and the excavators have partnered to design and implement training for the employees of operators, excavators, and locators.
- Element (8): A process for fostering and promoting the use , by all appropriate stakeholders, of improving technologies that may enhance communications, underground pipeline locating capability, and gathering and analyzing information about the accuracy and effectiveness of locating programs.
- Element (9): A process for review and analysis of the effectiveness of each program element, including a means for implementing improvements identified by such program reviews.

**Note: Each element in the Specific Objectives aligns with a respective element in the Workscope.** Further reference to accomplishments and future plans will reference only the Specific Objectives.

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**Accomplishments for this period (Item 1 under Article IX, Section 9.01 Progress Report: “A comparison of actual accomplishments to the objectives established for the period.”)**

*[How are you progressing on each of the items/elements provided in the “Specific Objectives” and “Workscope”? Start with an overall description followed by item-by-item or element-by-element detail if possible.]*

## **A) Progress Overview**

Colorado811 is pleased with the progress we have made through April 2012 with our damage prevention efforts defined in the 2011 PHMSA State Damage Prevention Grant (GRANT). The Damage Prevention Action Team (DPAT) was established in 2008 and continues to provide strong industry leadership and innovative public awareness programs. The DPAT is a group of about 50 representative industry stakeholders in Colorado that meets twice each year. This group discusses, designs and coordinates statewide public awareness efforts funded through the Grant and shares and reviews the progress made during the year on these programs. The Grant Administrator, Colorado811 Public Relations Administrator, and the DPAT Chairman serve as the group’s leadership, provide the Grant program and finance administration and meet with all the Damage Prevention Councils (DPC) throughout the year.

Each DPC is also allocated a share of the Grant funds to support local (multi-county level) 811 public awareness, public school education, and stakeholder education programs. These programs have proven to be both innovative and successful at raising public awareness (as measured annually by the level of incoming tickets) and reducing the level of facility damages (as measured annually by damages per 1,000 incoming tickets). At the fall DPAT meeting, industry stakeholders and DPCs that have made significant progress or implemented innovative programs are recognized for their efforts. This recognition program has been quite popular with the stakeholders.

Finally, with the analysis from the Colorado Damage Data Report© (published annually since 2001) and the Colorado Damage Prevention County Report Cards© (published annually since 2007), we have been able to measure and identify the areas of the state where significant progress has been made as well as those areas that need improvement in awareness and damage prevention. Each of the 64 counties in Colorado is graded on three industry metrics that have been developed over the past four years and given an overall damage prevention grade. By looking at past data, we have been able to produce report cards dating back to 2004 (for a total of seven years). Stakeholders as well as DPCs can review the report card to identify the progress they are making in 1) public awareness, 2) damage prevention, and 3) damage incident reporting (via the CGA Damage Information Reporting Tool (DIRT)). In addition, this data allows us to establish that there has been an overall improvement in public awareness and damage prevention at the county level since 2004. With this information, in 2009 we developed several statistical tests that validate progress has been made in public awareness and damage prevention and that those counties with a DPC are performing at higher awareness and damage prevention levels than counties without a DPC. We have worked diligently over the past four years to develop these report card metrics and statistical tests and are pleased that they support our statement that we have made significant progress with the assistance of the PHMSA Grant since 2008. Additional discussion of results is provided under “*Quantifiable Metrics*”.

Each of the five objectives is reviewed next and includes a summary status of the budget.

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## Objective 1) Foster Support and Partnership with Stakeholders

The DPAT met in April to review Grant funding and approve spring and summer public awareness activities. Approximately 70 industry stakeholders from around the state attended the 2 day meeting including One-Call administrators, facility owners, excavators, and first responders. Discussion included:

- Programs and funding for statewide damage prevention advertising program
- Programs and funding for Damage Prevention Awareness Week in April 2011
- Programs and funding for 811 Day in August 2011
- Programs and funding for DPC public awareness activities through September 2011
- Review progress on the DP Portal under development since 2008
- Funding for creation and delivery of a DP Stakeholder Education program in 2011
- Funding for development of a DP Education Registration & Testing web site in 2011

The DPAT met in October to review the 2010 Damage Report and County Report Cards and acknowledge top performers in damage prevention activities and results. Approximately 50 industry stakeholders from around the state attended the 2 day meeting including One-Call administrators, facility owners, excavators. Stakeholders identified major causes of facility damage and discussed attitudes and habits leading to facility damage.

Each of the 15 DPCs reviewed awareness and education activities from the winter and summer months (2010-2011). A number of the DPCs discussed the innovative methods (non-Grant funding) used to raise funds for supporting expanded DPC activities. Some of these included:

- Annual stakeholder support fees
- DP special program fees (primarily from pipeline operator support of RP1162 activities)
- Fees for stakeholder booths at excavator breakfasts
- Stakeholder advertising fees on clipboards
- Participant and sponsorship fees from industry golf tournaments

Colorado now has 15 DPCs in the state, representing 30 of the 64 counties, 88.3% of the state population, 87.1% of the annual incoming ticket count and 86.6% of the annual facility damage count.

The Grant Administrator has tracked and administered the Grant funding, planned and coordinated the DPAT meetings, and met with many of the DPCs around the state.

125 hours were budgeted and expended for both Grant Administration and measuring Quantifiable Metrics.

**STATUS: This objective is now complete.**

**The following tasks were planned after the Mid-Term Report:**

Fall DPAT meeting – Stakeholder Damage Prevention Awards	Complete
Program expense approval and tracking	Complete
Final Grant Report	Complete

Budget Review	Budget	Paid Out (Through 01/31/12)	Funds Available
DPAT Support (Room-Awards)	\$ 2,000.00	\$ 2002.30	\$ -2.30
Grant Administration	\$ 6,400.00	\$ 6,400.00	\$ 0.00
Admin Travel Expenses	\$ 1,000.00	\$ 450.87	\$ 549.13

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### Objective 2) Support Public Awareness and Stakeholder Education

**STATUS:** This objective is now complete.

**The following tasks have been completed:**

Support for Damage Prevention Awareness Spring-Summer-Fall 2011	
Statewide Video Media Advertising Campaign	\$ 13,500.00
811 Google Ad Clicks – June-December	\$ 2,483.07
811 Radio Advertising	\$ 2,000.00
Support DPC Awareness and Education	
811 Damage Prevention Events	\$ 1,371.61
811 CGA Press Kits	\$ 139.11
811 School Education Activity Books	\$3,000.00
811 Radio Advertising	\$ 1,500.00
811 Video Media Advertising	\$ 3,344.73
811 Promotional Decals	\$ 2,574.98
811 Promotional Yards Signs	\$ 943.39
811 DP Event Stakeholder Tote Bags	\$ 2084.04

**The following tasks were planned after the Mid-Term Report:**

Support for Fall and Winter Statewide Public Awareness Programs	Complete
Support for Fall and Winter DPC Support & Education	Complete

Budget Review	Budget	Paid Out (Through 01/31/12)	Funds Available
State 811 Public Awareness	\$ 18,000.00	\$ 17,983.07	\$ 16.93
Local DPC Support	\$ 15,000.00	\$ 14,957.86	\$ 42.14

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## Objective 3) Implement the Damage Prevention Education Program for Stakeholders

The DP Stakeholder Education Program was developed to deliver a safety education program for all stakeholders as mandated in the state One-Call Law. In 2011, the first year, the program focused on One-Call Law requirements, with a 2<sup>nd</sup> year program planned to focus on CGA Excavation Best Practices. Sixteen classes were conducted around the state and sponsored/supported by each local DPC. A certification test was given as well as a course survey conducted upon completion of the course. Additionally, in future years the course will be offered via recorded session on the internet.

The course content, course test and course survey were developed by a committee of industry stakeholders and delivered by industry professionals. Ten courses were complete in the summer with an additional six completed in the fall. The course was well received with 248 stakeholders attending.

**STATUS: This objective is now complete.**

**The following tasks have been completed:**

Develop stakeholder education course, certification test, and course survey

Deliver pilot course for two DPCs

Deliver course for eight DPCs (Total of 10 courses)

**The following tasks were planned after the Mid-Term Report:**

Deliver course for six additional DPCs Complete

Budget Review	Budget	Paid Out (Through 01//31/12)	Funds Available
Develop Education Course	\$ 8,000.00	\$ 8,000.00	\$ 0.00
Deliver Education Course	\$ 20,000.00	\$ 20,000.00	\$ 0.00
Education Travel Expenses	\$ 3,000.00	\$ 3,462.79	\$ -462.79
Education Material Printing	\$ 3,000.00	\$ 3,028.32	\$ -28.32

**NOTE: Education Material Printing was an Unbudgeted Expense**  
**(see Requests of AOTR in Mid-Term Report for reallocation request)**  
Co811 requested a reallocation of \$3,000 from the \$6,000 Education Travel Expenses to cover unbudgeted printing expense to support the Stakeholder Education Program. Education Travel Expenses were reduced by using only one instructor instead of 2 for most classes.

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### Objective 4) Foster and Promote Use of Improving Technologies

To support the DP Stakeholder Education Program, a Web Site was designed and developed to provide promotion, scheduling, and stakeholder registration for the course as well as an on-line course certification test. The web site was completed by year end and so not used for the 2011 classes. The course test and survey were delivered on-site after the course.

The development and use of the DP Education Web Site fosters the use of technology to improve the level of Education Course promotion, the quantity and quality of stakeholder communication and education, and the ease of record keeping and results tracking.

**STATUS: This objective is now complete.**

**The following tasks have been completed:**

Design on-line web site for course promotion, scheduling, registration and testing

**The following tasks were planned after the Mid-Term Report:**

Develop the DP Education Web Site Complete

Test and demo web site to select stakeholders for approval Complete

Budget Review	Budget	Paid Out (Through 09/2011)	Funds Available
Design Web Application	\$ 3,000.00	\$ 3,000.00	\$ 0.00
Web Development	\$ 17,000.00	\$ 17,000.00	\$ 0.00

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## Objective 5) Review the Effectiveness of Damage Prevention Programs

Our damage prevention review process has been defined over the past three years and allows us to review local and statewide progress on an annual basis at a county level. Analysis of valid data forms the cornerstone of the review process. This data is provided by both the excavators and facility owners and originates in the Norfield One-Call ticketing system and the CGA Damage Information Reporting Tool (DIRT). The DPCs are the focal point of the damage prevention programs and the annual improvement process. Without them, we would not have the manpower resources to implement both the public and stakeholder programs.

If the DPCs are in fact effective at increasing public awareness and improving damage prevention at the local level, then the critical question remains whether continued financial support of damage prevention programs for the DPCs is a worthwhile and desired outcome of the four year PHMSA Grant project.

**The purpose of the review and evaluation then is to determine if public awareness and damage prevention are improving and if the DPCs are contributing to that improvement.**

The damage prevention review and evaluation process includes the following tasks:

### Data Collection and Analysis Phase

1. Collect incoming ticket data at the county level from the Norfield Ticket System
2. Collect facility damage data at the county level from CGA DIRT
3. Collect demographic data at the county level from government sources
4. Analyze data, produce and publish the Annual Colorado Damage Report
5. Produce and publish the Annual Colorado County DP Report Cards
6. Share Colorado Damage Report and DP Report Cards with stakeholders

### Data Evaluation Phase

7. Evaluate the effectiveness of public awareness efforts, as measured by the Awareness Metric, in counties with an active DPC versus those counties with no DPC. Determine the number of counties above and below the current year Awareness Threshold. Recent public awareness efforts are effective if more counties have moved **above the current year Awareness Threshold**.
8. Evaluate the effectiveness of damage prevention efforts, as measured by the Damage Metric, in counties with an active DPC versus those counties with no DPC. Determine the number of counties above and below the 2004 Damage Threshold. Recent damage prevention efforts are effective if more counties have moved **below the 2004 Damage Threshold**.

### Feedback and Improvement Phase

9. Review Colorado County DP Report Cards and effectiveness measures with each DPC for relevant counties.
10. Assist each DPC with creating public awareness, public education and stakeholder education programs.
11. Assist each DPC with funding public awareness, public education and stakeholder education programs.

The preliminary metrics determined from the review and analysis will be reviewed in the “Quantifiable Metrics” section to follow.

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**STATUS:** This objective is now complete. But parts of this objective are ongoing throughout the year.

**The following tasks have been completed:**

- Obtain and review relevant data from all sources
- Analyze the data and determine the two current year DP Metrics
- Chart the two current year DP Metrics
- Evaluate the progress made for each county
- Publish the Annual Damage Report and County DP Report Cards

**The following tasks were planned after the Mid-Term Report:**

- Post the Annual Damage Report and County Damage Prevention Report Cards to the DP Portal Complete
- Review Annual Damage Report, County Report Cards, DP Metrics and program effectiveness results with DPCs at fall DPAT meeting Complete

Budget Review	Budget	Paid Out (Through 01/31/11)	Funds Available
Grant Administration (Measure Quantifiable Metrics)	\$ 3,600.00	\$ 3,600.00	\$ 0.00



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**Quantifiable Metrics/Measures of Effectiveness (Item 2 under Article IX, Section 9.01 Project Report: “Where the output of the project can be quantified, a computation of the cost per unit of output.”)**

*[This is difficult to explain across the board, but we’re trying to get a gauge for how effective this grant work is in improving your program. If your grant is more data oriented, you likely had some sort of metrics in mind to improve upon. If so, what were those metrics and how is the data looking now compared to when the program started? If you’re doing something along the lines of enforcement that involves incident review, how many cases have you been able to review/close and/or fines collected compared to before the grant work? If you pitched something more along the lines of public awareness, to how many stakeholders have you been able to reach? Even if you don’t have the metrics fully defined, put whatever you can here.]*

## **A) Overview of Quantifiable Measures of Effectiveness**

As defined under *Objective 5) Review the Effectiveness of Damage Prevention Programs, Data Evaluation Phase*, we defined two quantifiable measures of effectiveness:

### **1) Awareness Metric and Awareness Threshold**

The Awareness Metric is a measure of Incoming Tickets versus population for each county. The Incoming Tickets are first adjusted by the population density, to compensate for vertical building designs in denser population areas. As population density increases, there is tendency for fewer tickets since fewer utility lines utilities serve more people. The Natural Log is taken of both the density adjusted tickets and the population since the two numbers are of vastly different scale. The ratio of  $\text{LN}(\text{density adjusted tickets})$  and  $\text{LN}(\text{population})$  is formed. Each of the 64 county ratios is then weighted by the percent share of tickets and a weighted average of all 64 counties is formed. This weighted average is used as the Awareness Threshold for each year. A small number of counties are above the threshold, with the majority of the counties below the threshold. Our stated goal is to have more counties above the Awareness Threshold over time, indicating that public awareness is improving over time. This goal is accomplished by helping support the DPCs financially and by providing annual feedback on the progress of the two Damage Prevention Metrics. The feedback is provided with the Annual Damage Report and the Annual County Damage Report Cards.

### **2) Damage Metric and Damage Threshold**

The Damage Metric is a ratio of DIRT Damages versus 1,000 Density Adjusted Incoming Tickets for each county. The ratio for each of the 64 counties is then weighted by the percent share of damages and a weighted average of all 64 counties is formed. The 2004 weighted average is used as the Damage Threshold for all years. Counties will fall above and below the threshold. Our stated goal is to have more counties below the Damage Threshold over time, indicating that damage prevention is improving over time. This goal is accomplished by helping support the DPCs financially and by providing annual feedback on the progress of the two Damage Prevention Metrics. The feedback is provided with the Annual Damage Report and the Annual County Damage Report Cards.

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## B) Summary Review of Data from 2003 Through 2010

The two Damage Prevention Metrics are reviewed in more detail and an analysis provided in *Section C*). First, it may be helpful to provide a quick summary review of the data used to compile the County Damage Prevention Report Cards. The following table lists the statewide data from 2003-2010. 2010 is the last full year for which damage data has been reported and analyzed. Note that the 2011 Annual Damage Data Report should be available by August 2012.

- Demographic data
  - population,
  - population density
  - net migration
  - home building permits
- One-Call data
  - incoming tickets
  - number of counties (of 64) with reported DIRT data
  - DIRT facility damages
- DIRT facility damages for each facility type
- Damage metric (facility damages / 1,000 incoming tickets) for each facility type

**Table A**

2003-2010 UNCC State Damage Prevention Data											
DEMOGRAPHICS											
Land Area:	104,093	Square Miles							%Change	%Change	%Change
	2003	2004	2005	2006	2007	2008	2009	2010	2003-2010	2007-2010	2009-2010
Population:	4,583,430	4,649,698	4,718,562	4,813,536	4,908,108	5,013,015	5,083,221	5,160,189	12.6%	5.1%	1.5%
Population Density:	44.0	44.7	45.3	46.2	47.2	48.2	48.8	49.6	12.6%	5.1%	1.5%
Net Migration:	24,315	26,412	30,126	54,784	54,686	49,843	29,531	45,736	88.1%	-16.4%	54.9%
Building Permits:	39,569	46,199	45,891	38,343	29,454	18,998	9,355	11,591	-70.7%	-60.6%	23.9%
ONE-CALL DATA											
Incoming Tickets:	788,314	789,539	764,883	727,039	643,647	563,041	470,716	500,622	-36.5%	-22.2%	6.4%
Counties w/ Reported Damages:	56	56	52	56	56	51	55	53			
DIRT Facility Damages:	13,540	10,573	9,371	8,947	6,358	4,900	3,192	2,847	-79.0%	-55.2%	-10.8%
Telecommunications Damages	6,425	5,216	4,639	4,144	3,195	2,602	1,911	1,390	-78.4%	-56.5%	-27.3%
Natural Gas Damages	4,489	2,627	2,435	2,939	2,185	1,521	768	1,024	-77.2%	-53.1%	33.3%
Electric Damages	1,666	1,561	790	1,497	635	472	231	267	-84.0%	-58.0%	15.6%
Cable TV Damages	847	1,079	1,434	258	235	226	200	152	-82.1%	-35.3%	-24.0%
Water Damages	90	84	53	89	77	62	40	5	-94.4%	-93.5%	-87.5%
Sewer Damages	19	5	17	16	21	6	17	0	-100.0%	-100.0%	-100.0%
Other Damages	4	1	3	4	10	11	25	9	125.0%	-10.0%	-64.0%
DAMAGE METRIC											
Damages / 1,000 Tickets:	17.2	13.4	12.3	12.3	9.9	8.7	6.8	5.7	-66.9%	-42.4%	-16.1%
Telecom Damages / 1,000 Tickets	8.2	6.6	6.1	5.7	5.0	4.6	4.1	2.8	-65.9%	-44.1%	-31.6%
Nat Gas Damages / 1,000 Tickets	5.7	3.3	3.2	4.0	3.4	2.7	1.6	2.0	-64.1%	-39.7%	25.4%
Electric Damages / 1,000 Tickets	2.1	2.0	1.0	2.1	1.0	0.8	0.5	0.5	-74.8%	-45.9%	8.7%
Cable TV Damages / 1,000 Tickets	1.1	1.4	1.9	0.4	0.4	0.4	0.4	0.3	-71.7%	-16.8%	-28.5%
Water Damages / 1,000 Tickets	0.11	0.11	0.07	0.12	0.12	0.11	0.08	0.01	-91.3%	-91.7%	-88.2%
Sewer Damages / 1,000 Tickets	0.02	0.01	0.02	0.02	0.03	0.01	0.04	0.00			
Other Damages / 1,000 Tickets	0.01	0.00	0.00	0.01	0.02	0.02	0.05	0.02			

The following six multi-year trends stand out in the data from Table A:

- 1) State population has steadily increased by 1.4%-2.0% per year
- 2) Building permits decreased 80% from 2004 to 2009, but increased 24% in 2010
- 3) Incoming tickets decreased 40% from 2004 to 2009, but increased 6.4% in 2010
- 4) Facility damages decreased 70% from 2004 to 2009, and also decreased 10.8% in 2010
- 5) The Damage Metric decreased 50% from 2004 to 2009, and also decreased 16.2% in 2010
- 6) While the decrease in facility damages (55%) from 2007 to 2010 was concurrent with a decrease in construction activity, the unexpected decrease in the Damage Metric from 2007 to 2010 (42%) represents the time frame that PHMSA provided grant money to fund collaborative damage prevention efforts in Colorado.

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There are four general conclusions that can be drawn from these six multi-year trends:

- 1) **Incoming tickets have decreased at a much slower rate (about one-half the rate) than construction activity has decreased, as measured by building permits.** This is a positive trend and may indicate that the general awareness level has in fact increased over time. Of course, it may also indicate that building construction companies were not requesting an appropriate level of tickets for the level of excavation activity involved since they contributed to a large share of the slowdown in excavation activity.
- 2) **Facility damages have decreased at a much faster rate (nearly twice the rate) than incoming tickets have decreased.** It is always a good result when damages decrease, but if they are not decreasing at a faster rate than tickets are decreasing, progress has not been made. This result is a positive trend that points to a driving force that has improved damage prevention efforts by stakeholders.
- 3) **The Damage Metric (facility damages / 1,000 incoming tickets) has decreased over time.** Since this is a ratio of two industry measures, either of the measures could be impacting the decrease in the ratio. In this case, both measures have decreased, and since the numerator (damages) decreased at a faster rate than the denominator (tickets) decreased, the ratio decreased. This is a positive trend that points to a driving force that has improved damage prevention efforts by stakeholders.
- 4) **Since PHMSA provided grant funding in 2008, 2009 and 2010 for public awareness and stakeholder education, there has been a significant increase in the rate of improvement for most of the measures.** We view this as a positive trend, though it is so far limited to these three years. Damage data for 2011 has not been fully reported and analyzed at this time.

## C) Quantifiable Measures of Effectiveness

In addition to inspecting a table of numbers (all valid results), we will visually present the relationship between the Awareness Metric and its Threshold and the Damage Metric and its Threshold on a two dimensional scatter chart to see if there is an observable pattern or trend in the data.

The three scatter charts on page 15 visually demonstrate the improvements made in damage prevention for Colorado from 2004 through 2010. Each chart provides a snapshot of a measure of Facility Damage (a variation of the Damage Metric) versus a measure of Public Awareness (a variation of the Awareness Metric) for 2004, 2009 and 2010.

**We can state two hypotheses regarding damage prevention efforts:**

- 1) As we create and support active Damage Prevention Councils (DPCs) within a county, public awareness should improve each year (as measured by the Public Awareness Metric) as a result of their efforts in the community.
- 2) As we fund and support improvements in the quantity and quality of public awareness and stakeholder education efforts within a county, the Damage Metric should decrease within the county over time.

To understand how the three charts demonstrate these improvements, we must first explain how the charts are setup and how to interpret the information.

- a) Each chart (one for each of three different years) represents a measure of Public Awareness on the horizontal X axis and a measure of Facility Damage on the vertical Y axis.

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- b) The **measure of Public Awareness** is the County Awareness Metric for the year less the Awareness Threshold for the state that year. The Awareness Threshold (the current year ticket weighted average of the Awareness Metric) becomes the -0- vertical axis line and positive numbers to the right of the axis line represent higher levels of public awareness, while negative numbers to the left of the axis line represent lower levels of public awareness. The change over time (improvement) is easier to visualize using this measure instead of the raw value.
- c) The **measure of Facility Damage** is the 2004 Damage Threshold (the 2004 damage weighted average of the Damage Metric) for the state less the County Damage Metric for that year. The 2004 Damage Threshold becomes the -0- horizontal axis line and positive numbers above the axis line represent lower levels of facility damage, while negative numbers below the axis line represent higher levels of facility damage. The change over time (improvement) is easier to visualize using this measure instead of the raw value.
- d) The two axes divide the chart into **four quadrants**. Each quadrant represents a hypothesized cause-effect relationship between the Awareness Metric and Damage Metric.
- |                        |                         |                         |
|------------------------|-------------------------|-------------------------|
| Quadrant 1 Upper Right | Higher Public Awareness | Lower Facility Damages  |
| Quadrant 2 Upper Left  | Lower Public Awareness  | Lower Facility Damages  |
| Quadrant 3 Lower Left  | Lower Public Awareness  | Higher Facility Damages |
| Quadrant 4 Lower Right | Higher Public Awareness | Higher Facility Damages |
- e) There is a small **green box** with a number and a small **blue box** with a number in each quadrant. The green box represents the number of counties in the quadrant with an active Damage Prevention Council. The blue box represents the number of counties in the quadrant without a Damage Prevention Council.
- f) The 64 **square data points** represent each of the counties within the state for that year. The green data points are counties with an active Damage Prevention Council that year. The blue data points are counties without a Damage Prevention Council that year.

Table B summarizes the number of counties that fall in each quadrant for each year, showing both counties with and counties without a Damage Prevention Council. Careful study of the scatter charts on page 15 and Table B reveal progressive improvements from 2004 through 2010 in public awareness and the facility damage metric as Damage Prevention Councils have been created and supported.

**Table B** - Summary of Awareness Metric versus Damage Metric Scatter Chart  
Counties in each Quadrant with and without a DPC

QUADRANT	Quadrant 1	Quadrant 2	Quadrant 3	Quadrant 1	Quadrant 2	Quadrant 3	Total
YEAR	With DPC	With DPC	With DPC	W/O DPC	W/O DPC	W/O DPC	
2004	6	2	0	2	28	26	64
2009	9	12	3	3	29	8	64
2010	10	18	2	3	25	6	64

### Observations

- 1) **Quadrant 4 represents the worst relationship for a county to attain** – high public awareness and high facility damages. Note that there are no counties in this quadrant in any year.

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- 2) **Quadrant 1 represents the best relationship for a county to attain** – high public awareness with low facility damages. Note the number of counties in this quadrant increased from  $(6+2=8)$  in 2004 to  $(10+3=13)$  in 2010. Five counties moved from Quadrant 2 into Quadrant 1, a positive development as these counties improved their Awareness Metric and moved above the Awareness Threshold. Ten of the thirteen counties in Quadrant 1 in 2010 had an active Damage Prevention Council, while three counties did not.
- 3) **Quadrant 2 represents the next best relationship for a county to attain** – lower public awareness with lower facility damages. Note the number of counties in this quadrant increased from  $(2+28=30)$  in 2004 to  $(18+25=43)$  in 2010. Eighteen counties moved from Quadrant 3 up into Quadrant 2, a positive development as these counties reduced their Damage Metric and moved below the 2004 Damage Threshold (above -0- line). Eighteen of the 43 counties in Quadrant 2 in 2010 had an active Damage Prevention Council, while 25 counties did not.
- 4) **Quadrant 3 represents the worst relationship for a county to attain** – lower public awareness with higher facility damages. Note the number of counties in this quadrant decreased from  $(0+26=26)$  in 2004 to  $(2+6=8)$  in 2010. Eighteen counties moved from Quadrant 3 up into Quadrant 2, a positive development as these counties reduced their Damage Metric and moved below the 2004 Damage Threshold (above -0- line). Only two of the eight counties in Quadrant 3 in 2010 had an active Damage Prevention Council, while six counties did not.

### To summarize these observations:

- 20.3% (13 of 64) of the counties have a high Public Awareness and a low Damage Metric. From 2004 through 2010, the number of counties in this quadrant increased from eight to thirteen.
- 12.5% (8 of 64) of the counties have a low Public Awareness and a high Damage Metric. From 2004 through 2010, the number of counties in this quadrant decreased from 26 to eight.
- 67.2% (43 of 64) of the counties have a low Public Awareness and a low Damage Metric. From 2004 through 2010, the number of counties in this quadrant increased from 30 to 43.
- From 2004 through 2010, the number of counties with an active Damage Prevention Council increased from eight to 30.
- From 2004 through 2010, the number of counties with a Damage Metric above the 2004 Damage Threshold (10.78) decreased from 26 to 8. This means 18 counties improved their Damage Metric over these years. This is an important improvement in damage prevention in Colorado.
- From 2004 through 2010, the descriptive statistics of the Damage Metric for the state improved significantly:
  - the average County Damage Metric decreased from 12.75 to 6.29, a significant 51% decrease.
  - the worst County Damage Metric decreased from 62.09 to 35.38.
  - the standard deviation, or range of the County Damage Metric decreased from 12.3 to 5.9, a significant 52% decrease.

NOTE: Since the County Damage Metric is derived from a population density adjustment and mathematical transformation (Natural Log), the value of the metric does not have a direct interpretation to the number of facility damages, but a lower value is better than a higher value.

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**In conclusion**, the data and observations presented above demonstrate that Colorado's dedicated industry stakeholders have successfully improved damage prevention efforts from 2004 through 2010 by moving several counties above the Awareness Threshold and by moving many counties below the 2004 Damage Threshold. In addition, stakeholders have decreased the Damage Metric from 2004 through 2010 for many individual counties and the state as a whole.

In the 2009 Mid-Term Report, we made the following 3 claims and provided a mechanism using this same information (from 2004 and 2009) to statistically validate each claim with a high level of confidence. The additional information from 2010 adds additional significance to these claims.

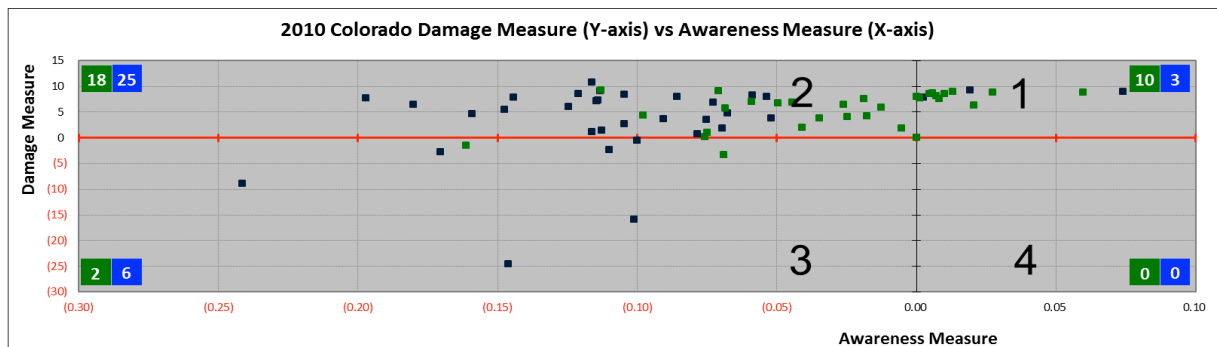
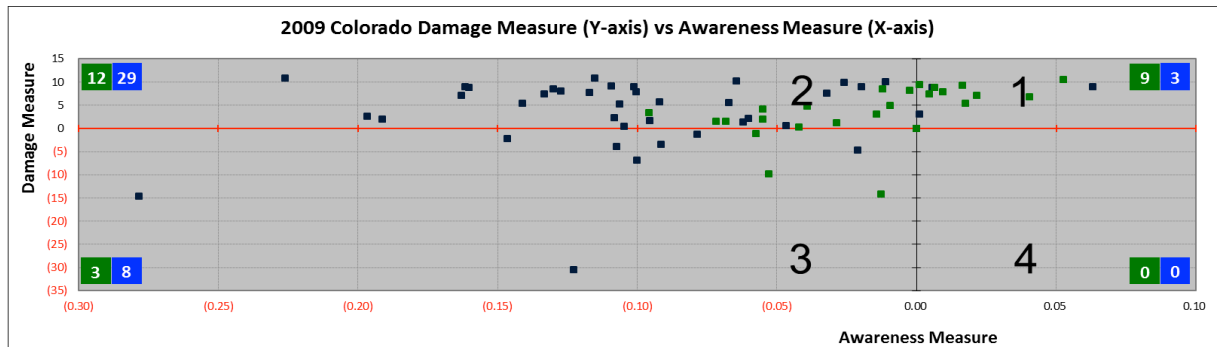
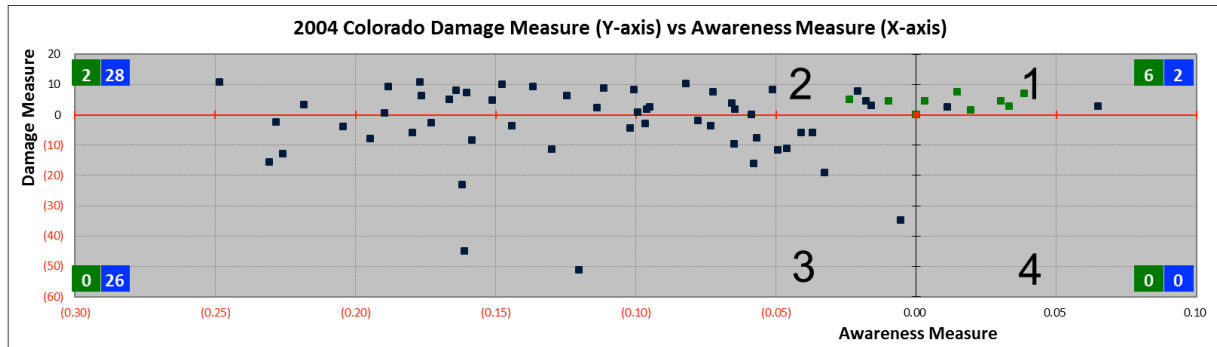
- Claim Statement-1: Counties with an active DPC have higher levels of public awareness than counties without an active DPC.
- Claim Statement-2: Counties with an active DPC have better (lower than the 2004 Damage Threshold) levels of damage prevention than counties without an active DPC.
- Claim Statement-3: The Damage Metric is significantly lower in 2009 than it was in 2004.

Our conclusion is that creating DPCs and supporting appropriate public awareness and stakeholder education programs is an effective method to enhance public awareness and improve damage prevention efforts in Colorado.

Acknowledgement goes out to the staff at CO811, the volunteers on the Damage Prevention Action Team, the fifteen Damage Prevention Councils around the state, the facility locate companies, and the many excavators and facility owners who support damage prevention best practices. A special thank you goes to DOT-PHMSA for providing the grant funding since 2008 that supported many of the damage prevention activities that have helped make a difference in Colorado.

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## Scatter Charts of Damage Metric versus Awareness Metric, 2004, 2009, & 2010



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## D) 811 Educational Series - Measures of Effectiveness

Our first stakeholder educational series was developed and delivered in 2011. The program focused on presenting stakeholder requirements defined in the Colorado One Call Law. The program was developed and delivered by several industry stakeholders in the summer of 2011.

- 16 classes were delivered around the state in a number of large cities and rural towns
- 248 industry stakeholders attended the classes
- The cost to develop the educational program was \$ 8,000.00
- The cost to deliver the program (including instructor, printing and travel) was \$ 26,491.11
- A certification test was given for each attendee – all attendees passed the test
- A survey was completed by each attendee – the results are compiled below

### 1) Educational Program Survey Results

- Each question was rated on a scale from 1 (low) to 5 (high)
- The average rating for all questions was 4.7 and the average ranged from 4.5 to 4.9
- The average rating for all classes was 4.7 and the average ranged from 4.5 to 4.8

2011 Colorado 811 Education Series					Survey Questions											
			Total Attendees	248	4.7	Class educational- informative	Class helps understand OneCall Law	Class helps submit ticket request	Recommend class to others	Handouts were helpful	Class helped prepare for test	Were your questions answered	Instructor knowledge	Instructor presentation	Facility adequate	#of Comments
			Max Size	34	Lowest for Question	4.2	4.2	4.2	4.5	4.4	4.2	83.3%	4.6	4.7	4.4	3.0
			Min Size	6	Average for Question	4.6	4.5	4.5	4.7	4.6	4.6	93.2%	4.9	4.8	4.7	6.1
DPC	City	Date	Instructors	Attendees	Average per Class	Q-1	Q-2	Q-3	Q-4	Q-5	Q-6	Q-7	Q-8	Q-9	Q-10	Comments
Denver Metro DPC	Golden	2-Jul-11	CL-1) Brent Summer, CL-2) Darrel Vanhooser	29	4.5	4.6	4.2	4.4	4.7	4.4	4.5	96.6%	4.8	4.8	4.6	14
El Paso County DPC	Colorado Springs	13-Jul-11	Brent Summer	17	4.7	4.5	4.6	4.6	4.6	4.7	4.5	88.2%	5.0	4.8	4.8	4
PEG DPC	Glenwood Springs	18-Aug-11	Darrel Vanhooser	12	4.7	4.7	4.5	4.4	4.7	4.6	4.6	83.3%	4.8	4.8	4.7	4
Denver Metro DPC	Evergreen	24-Aug-11	Brent Summer	20	4.8	4.6	4.7	4.9	4.6	4.8	4.5	85.0%	4.9	4.8	4.9	5
Gunnison Area DPC	Gunnison	28-Sep-11	CL-1) Brent Summer, CL-2) Darrel Vanhooser	20	4.7	4.8	4.7	4.5	4.7	4.7	4.6	100.0%	4.8	4.9	4.4	11
Denver Metro DPC	Aurora	11-Oct-11	Darrel Vanhooser	34	4.5	4.4	4.4	4.5	4.6	4.4	4.4	94.1%	4.6	4.7	4.7	7
Denver Metro DPC	Greely	13-Oct-11	Darrel Vanhooser	18	4.7	4.6	4.6	4.7	4.7	4.7	4.7	94.4%	4.9	4.8	4.8	3
Denver Metro DPC	Arvada	14-Oct-11	Darrel Vanhooser	20	4.6	4.5	4.6	4.6	4.7	4.5	4.6	95.0%	4.8	4.9	4.6	3
Mesa County DPC	Grand Junction	19-Oct-11	Darrel Vanhooser	11	4.8	4.8	4.6	4.6	4.9	4.9	4.8	100.0%	5.0	5.0	4.9	6
Montrose Area County DPC	Montrose	19-Oct-11	Brent Summer	11	4.8	4.5	4.8	4.6	4.8	4.8	4.7	100.0%	5.0	4.9	4.7	4
Mesa County DPC	Grand Junction	19-Oct-11	Darrel VanHooser	6	4.4	4.2	4.3	4.2	4.5	4.5	4.2	83.3%	4.8	4.7	4.7	3
Unknown	Monte Vista	9-Nov-11	Brent Summer	18	4.6	4.5	4.5	4.4	4.6	4.6	4.8	94.4%	5.0	4.9	4.5	7
Las Animas County DPC	Trinidad	18-Nov-11	CL-1) Brent Summer, CL-2) Darrel Vanhooser	32	4.6	4.6	4.4	4.5	4.7	4.6	4.6	96.9%	4.9	4.9	4.7	8

### 2) Educational Program Quantifiable Metrics

- The total cost of the educational program development and delivery was \$ 34,491.11
  - The cost of the educational program development and delivery per class was \$ 2,155.69
  - The cost of the educational program development and delivery per attendee was \$ 139.08
  - The additional cost of the web site for promoting, registering and testing was \$ 20,000.00
- It is not appropriate to assess this cost on a per class or per attendee basis as the costs can be distributed over future years.



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**Issues, Problems or Challenges (Item 3 under Article IX, Section 9.01 Project Report: “The reasons for slippage if established objectives were not met. “)**

*[If the project is progressing on schedule, simply state that there are no issues, problems or challenge to report. If there have been delays for any reason, explain what they are and how that may impact the grant work. For instance, with some States, even after an agreement is in place, it has to be sent back to the Governor’s office for approval, which takes more time than originally anticipated. Even if work begins right away after the agreement is in place, other delays can be caused by personnel changes or simply having a better understanding of the effort required once the work is underway. ]*

There are no issues, problems or challenge to report

## Mid-term Financial Status Report

*[Per the instructions in Article IX, Section 9.03 of your agreement (included below), the financial status report should go to the Agreement Administrator (AA). For this section of the progress report, simply state “The mid-term financial report has been sent as a separate attachment to the AA.”. However, if there are any issues with the Financial Status Report or additional explanation is needed, please provide that information here. If there are any delays for whatever reasons, these should be communicated to the AA and AOTR in advance.*

*From Article IX, Section 9.03 of your agreement: “During the performance of the grant, the Grantee must submit a mid-term Financial Status Report, Standard Form 425 (SF-425), to report the status of funds. In addition to SF-425, the Grantee should provide the break down of costs for each object class category (Personnel, Fringe Benefits, Travel, Equipment, Supplies, Contractual, Other, and Indirect Charges). This report must be submitted to the AA in electronic form via e-mail no later than [refer to your agreement for date.]”]*

The Mid-Term Financial Report has been sent as a separate attachment to the AA

The Final Financial Report was sent as a separate attachment to the AA on February 14, 2012

A summary of the 2011 Grant budget, expense, funds available, hours used, and hours remaining is presented below.

CO811 returned \$ 114.79 to PHMSA in February 2012 along with a completed 2011 SF425.

**Table C**

2011 PHMSA Grant Funding Summary	Program Item	Budget	Expense	Available	Hrs Used	Hrs Remain	Budget
Objective 1) Foster Support and Partnership with Stakeholders	DPAT Support	\$ 2,000.00	\$ 2,002.30	\$ (2.30)			
	Grant Administration, Reports	\$ 6,400.00	\$ 6,400.00	\$ -	80.00	0.00	80.00
	Travel Expense - Administrator	\$ 1,000.00	\$ 450.87	\$ 549.13			
Objective 2) Support Public Awareness and Stakeholder Education	Statewide 811 Public Awareness	\$ 18,000.00	\$ 17,983.07	\$ 16.93			
	Local DPC Support	\$ 15,000.00	\$ 14,957.86	\$ 42.14			
Objective 3,4) Damage Prevention Education Program for Stakeholder	Develop Education Course	\$ 8,000.00	\$ 8,000.00	\$ -	100.00	0.00	100.00
	Deliver Education Course	\$ 20,000.00	\$ 20,000.00	\$ -	250.00	0.00	250.00
	Design Web Applications	\$ 3,000.00	\$ 3,000.00	\$ -	37.50	0.00	37.50
	Develop Education Web Site	\$ 17,000.00	\$ 17,000.00	\$ -			
	Travel Expense - Education Course	\$ 3,000.00	\$ 3,462.79	\$ (462.79)			
	Print Education Handouts	\$ 3,000.00	\$ 3,028.32	\$ (28.32)			
Objective 5) Review Effectiveness of Damage Prevention Programs	Quantifiable Program Metrics	\$ 3,600.00	\$ 3,600.00	\$ -	45.00	0.00	45.00
<b>Totals</b>		<b>\$ 100,000.00</b>	<b>\$ 99,885.21</b>	<b>\$ 114.79</b>	<b>512.50</b>	<b>0.00</b>	<b>512.50</b>
<b>Note: Returned to PHMSA February 2012</b>							

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## Plans for Next Period (Remainder of Grant)

*[In most cases, this section should just mention your plans for the remainder of the project. However, if you need to change the workscope at all for any reason, including whether you need to modify, remove, or add items, please explain.]*

In the Mid-Term Report, CO811 submitted the following plans.

### **Objective 1) Foster Support and Partnership with Stakeholders**

- DPAT Support

  - Fall DPAT meeting – October 2011

- Grant Administration

  - Track grant expenses

  - Prepare final grant report

  - Prepare final grant finance report

### **Objective 2) Support Public Awareness and Stakeholder Education**

- Statewide and Local Support

  - Support for fall and winter statewide Public Awareness Programs

  - Support for fall and winter local DPC Public Awareness Programs

### **Objective 3) Implement the Damage Prevention Stakeholder Education Program**

- Deliver Education Course to another 10 DPC locations

### **Objective 4) Implement the Damage Prevention Stakeholder Education Web Site**

- Complete design and development of DP Stakeholder Education Web Site

- Test and demo web site to select stakeholders for approval

### **Objective 5) Review the Effectiveness of Damage Prevention Programs**

- Post the Annual Damage Report and County Damage Prevention Report Cards to the DP Portal

- Review Annual Damage Report, County Report Cards, DP Metrics and program effectiveness results with DPCs at fall DPAT meeting

As of April 30, 2012, all objectives and tasks were accomplished on schedule.

There are no further plans as this grant is complete.

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### Requests of the AOTR and/or PHMSA

*[In most cases, any questions or actions requested of the AOTR and PHMSA (such as grant modifications in anyway) should have been addressed in advance of filing the report. If this is the case, simply state “No actions requested at this time” or explain any actions that are currently in process. However, if something has come up recently, or if you haven’t been able to discuss with the AOTR yet, please describe here. ]*

In the Mid-Term Report, Co 811 requested a reallocation of \$3,000 from the Total Travel Expense Line Item (\$7,000) to be used for printing support material for the DP Stakeholder Education Course. This item was overlooked in the original grant budget. The budgeted travel expenses were reduced by reducing the number of instructors for the stakeholder education courses from two to one instructor.

No additional requests were made.

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## April Report Plan

<b>Objectives</b>	AII-S2.03	COMPLETE
<ul style="list-style-type: none"><li>○ Foster Support and Partnership with Stakeholders (See Element 2)</li><li>○ Support Public Awareness and Stakeholder Education (See Element 5)</li><li>○ Support a Damage Prevention Education Program for industry stakeholders (See Element 4)</li><li>○ Foster and promote the use of Improving Technologies (See Element 8) and</li><li>○ Review the Effectiveness of Damage Prevention Programs (See Element 9)</li></ul>		
<b>Workscope</b>	AIII	COMPLETE
<b>Accomplishments</b>	Each Objective	
Overview		April 21, 2012
Objective 1		COMPLETE
Objective 2		COMPLETE
Objective 3		COMPLETE
Objective 4		COMPLETE
Objective 5		COMPLETE
<b>Quantifiable Metrics</b>		
Damage Reduction		
New DPCs		
Education Classes		
Education Survey		
<b>Issues, Problems</b>		COMPLETE
<b>Financial Status Report to AA</b>		COMPLETE
Update Cost Summary Table C		April 21, 2012
SF-425		Emailed 2/14/12
Object Class Category		April 21, 2012
<b>Plans for Next Period</b>		COMPLETE
<b>Requests of AOTR</b>		COMPLETE